

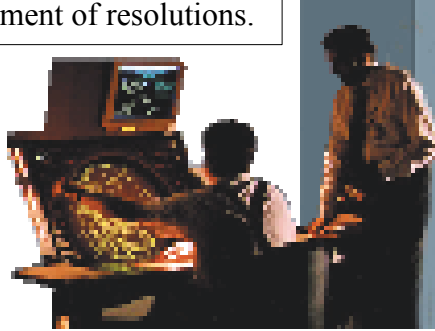
## ER-7: Accommodate User Preferred Routing

### Optimize airspace use by providing decision support tools to controllers.

Strategic planning by controllers makes use of automated prediction of separation conflicts and assessment of resolutions.

Controllers manage assigned meter times with the use of automation projections.

Options for conflict resolution are provided for controller consideration and decisions.



### Background

Today, controllers have a view of the airspace that is bounded by the sectors for which they have jurisdiction. This view limits the options available to the controller to solve problems. In addition, a fixed route structure is used to organize the airspace, providing controllers with predictable points where conflicts may arise. This fixed route structure allows controllers to maintain a three-dimensional view of the traffic situation. In some cases, however, this results in aircraft being separated from airspace. In the current environment, flow constraints (e.g., Miles-in-Trail restrictions, ground delay programs, re-routes) are used to avoid situations where the number of aircraft being controlled by an en route sector controller is beyond the controller's ability to provide separation services. This also results in the users being constrained in their choice of flight paths.

### Ops Change Description

By providing Air Traffic Management decision support capabilities to the sector, controllers are able to see beyond their own sector boundaries, allowing some restrictions to be removed, increasing the options to solve problems as well as increasing the likelihood that more efficient services can be provided. This will be accomplished through the addition of strategic management tools that complement the tactical control techniques used to maintain safety. These strategic tools provide advisory information about routes and/or altitude options that can avoid conflicts and weather situations. The specific decision support capabilities are:

- ER-7.1: Conflict Identification and Planning, which assists controllers in the prediction of aircraft-aircraft and aircraft-airspace conflicts and which has capabilities for controllers to construct and assess alternatives. The User Request Evaluation Tool (URET), being developed and deployed under Free Flight Phase 1 and 2, will provide these capabilities.

- ER-7.2: Metering and Merge Planning, which provides a metering plan to TMCs and provides information to controllers to quantify the differences between assigned meter times and the times that aircraft are projected to cross a meter fix. The Traffic Management Advisor (TMA), being developed and deployed under Free Flight Phase 1 and 2, will provide these capabilities at some locations. An enhanced version of TMA, which can be used at additional locations, is currently in research.
- ER-7.3: Conflict Resolution and Planning Aids, which are used by controllers to generate proposed solutions to aircraft-aircraft and aircraft-airspace conflicts and to identify instances where a more direct route will result in user savings. A resolution capability - Problem Analysis, Resolution, and Ranking (PARR) and a direct routing aid - Direct-to (D2) are currently being researched.

From the user perspective these capabilities will support their ability to fly routes that are defined by points in the airspace (latitude/longitude/altitude), with fewer restrictions caused by the structure of the airspace.

### **Benefit, Performance and Metrics**

- Reduction in static airspace restrictions.
- The total miles flown through a center will decrease.
- Hourly flow by ARTCC and Sector will be increased.
- Fewer low-altitude holds will be invoked.
- Fly as filed percentage (including altitude) will increase.
- User-requested re-route percentage being granted will increase.

### **ER-7.1 Conflict Identification and Planning**

Decision support tools assist the controller in detecting conflicts and assessing potential changes to the aircraft's path.

#### **Scope and Applicability**

- URET can be applied to all en route airspace. The benefits URET provides depend on the traffic levels and complexity that sector controllers have to deal with. For greatest benefit, URET should be available in contiguous airspace.
- By the end of FY 02, FFP1 introduces URET to five additional centers (Cleveland, Chicago, Kansas City, Washington and Atlanta) and replaces the prototype at Memphis and Indianapolis Centers.
- Long-Term: FFP2 will expand URET to Minneapolis, Denver, Albuquerque, Fort Worth, Jacksonville, New York, Houston, Boston, Miami, Salt Lake City, Seattle, Oakland and Los Angeles centers. The FFP2 program office has not established URET schedules, but the deployments will be complete prior to 2005, with initial daily use at four sites in FY 03 and nine sites in FY 04.

## **Key Decisions**

- None identified.

## **Key Risks**

- None identified.

## **ER-7.2 Metering and Merge Planning**

Decision support tools provide the TMC with a metering plan and the controller with information on the required delays for each aircraft (also see AD-4.2).

### **Scope and Applicability**

- TMA (Traffic Management Advisor) is applicable for airports where arrival demand regularly exceeds capacity.
- TMA-SC (Traffic Management Advisor – Single Center) near-term and mid-term locations include: ZFW-DFW (complete), ZMP-MSP (complete), ZDV-DEN (complete), ZMA-MIA (complete), ZOA –SFO (complete), ZLA-LAX (complete), and ZTL-ATL (complete).
- Additional arrival sites will require site specific adaptation. FFP2 plans to deploy TMA-SC to support arrivals at the following airports: ZME-MEM, ZKC-STL, ZID-CVG, and ZHU-IAH. Deployment order and schedule have not been finalized, but the current plan is to deploy to 1 site in FY 03, 2 sites in FY04, and 1 site in FY 05. Expansion to additional sites may include supporting arrivals to MCO, CLT, SEA, SLC, PHX, BOS, and LAS.
- TMA-MC (Traffic Management Advisor – Multi Center) will enhance TMA to work in areas where the airport is close to the center boundaries and where arrival flows interact with flows to other airports. RTCA recommended TMA for several sites that require TMA-MC capability, these include Washington area airports, N90 airports, PHL, DTW, SDF, BOS, and PIT. NASA is developing TMA-MC with emphasis on PHL airspace; this capability should be ready for evaluation in FY 03.

## **Key Decisions**

- Priorities for TMA deployments beyond the current recommendations.

## **Key Risks**

- NASA is currently researching TMA-MC. Implementation is dependent on the success of this research and on NASA participation in technology transition.
- New York and Philadelphia redesign activities will result in changes to TMA adaptation and therefore work in these areas needs to be coordinated.

## **ER-7.3 Conflict Resolution and Planning Aids**

Decision support tools will assist the controller's ability to resolve conflicts and to generate direct routes.

### **Scope and Applicability**

- En route conflict resolution aids expand on the conflict probe capability provided by URET CCLD.
- Research is currently underway on a direct-to tool that identify instances where a more direct route will result in user savings and on conflict resolution aids that assist the controller in generating solutions. These capabilities should undergo full scale evaluation in FY02-04. A spiral development approach will allow some capabilities to be implemented early.

### **Key Decisions**

- None identified.

## **Key Risks**

- MITRE/CAASD is currently researching conflict resolution aids (PARR - Problem Analysis, Resolution, and Ranking). Implementation is dependent on the success of this research and on CAASD participation in technology transition.
- NASA is currently researching a direct-to (D-2) capability. Implementation is dependent on the success of this research and on NASA participation in technology transition.